

I.—In Memoriam—Sir John William Dawson.

By FRANK DAWSON ADAMS, M.Sc., Ph.D.

(Read May 21, 1901.)

It is with deep regret that we record the death of Sir William Dawson, which took place at Montreal on the morning of November 18th, 1899, in the eightieth year of his age. In him the Royal Society of Canada loses its first President and one of its most distinguished members, and Canada loses an eminent geologist and naturalist, as well as one who was intimately identified with educational work of all kinds, but more especially with the higher education in the province of Quebec.

Sir John William Dawson was born at Pictou on October 13th, 1820, and was therefore a native of Nova Scotia, a province which has produced more than its share of the Canadians who have risen to eminence in the various walks of life. His father, James Dawson, was from near Aberdeen, Scotland, and came to Nova Scotia to fill a position in a leading business house in Pictou. On the termination of his engagement he began business on his own account, becoming in the course of time one of the chief ship-builders in that part of Nova Scotia. James Dawson had but two children, of whom Sir William was the elder. The younger died at an early age, thus leaving Sir William the sole survivor of the family.

While still at school in Pictou, he developed a love for natural science, inherited from his father, and made large collections of fossil plants from the Nova Scotian coal measures, so well exposed about his native place. He speaks of himself at that time as being a "moderately diligent but not a specially brilliant pupil." On leaving school he studied at the Pictou Academy and subsequently at the University of Edinburgh. While at the former seat of learning, at the age of sixteen, he read before the local Natural History Society his first paper, having the somewhat ambitious title, "On the Structure and History of the Earth."

At Edinburgh he studied under Jamieson, Forbes and Balfour, as well as with Alexander Rose, whom he refers to in some notes and reminiscences as a single-hearted mineralogist and the greatest authority on the mineralogy of Scotland. He records his impression of the University of Edinburgh at that time as being "a very imperfect school of natural science in comparison with our modern institutions," and adds: "Jamieson, who was my principal teacher, devoted a large portion of the earlier lectures of his course to physiography, and the rest to minerals and rocks, but I was surprised to find how little even some

of the most eminent English geologists of the day knew of mineralogy, and how uncertain in consequence was their diagnosis in the field of the nature of rock masses."

In 1841 he met, however, two men with whom he was afterwards intimately associated in his work—Sir Charles Lyell, who more than any other man gave form to modern geological science, and Sir William Logan, who gave the first great impetus to the study of the older rocks of the northern half of the North American continent, and who founded the Geological Survey of Canada.

In 1847 he married Margaret A. Y. Mercer, daughter of G. Mercer, Esq., of Edinburgh, and returned to Nova Scotia. Two years later he went to Halifax to give a course of lectures on natural history subjects in connection with Dalhousie College, and organized classes for practical work in mineralogy and palæontology. These were attended by students, citizens, and pupils of higher schools—a foreshadowing of university extension. In 1850, at the age of thirty, having already attracted some attention by the publication of a number of papers, reports, and lectures, he was appointed Superintendent of Education for Nova Scotia. His work in connection with this position obliged him to travel continually through all parts of the province and on these journeys he accumulated that immense mass of information concerning the geology and mineral resources of Nova Scotia which is incorporated in his largest work—that entitled "Acadian Geology."

Sir Charles Lyell, who, as above mentioned, on his first visit to America in 1841 met Sir William and was by him conducted to many places of geological interest in Nova Scotia, returned to Nova Scotia in 1852, and with Sir William continued his studies in Nova Scotian geology. In a letter to Leonard Horner, dated September 12th of this year, Lyell writes:

"My companion J. W. Dawson, is continually referring to the curious botanical points respecting calamites, endogenites, and other coal plants, on which light is thrown by certain specimens collected by him at Pictou. He told me that the root of the pond lily, *Nymphaea odorata*, most resembled *Stigmaria* in the regularity of its growth, and Dr. Robb showed me a dried specimen, a rhizoma, which, being of a totally different family, and therefore not strictly like, still suggests the probability of the *Stigmaria* having grown in slush in the same manner."

And in another part of the same letter, referring to the now celebrated Joggins section of the coast of Nova Scotia, he says:

"Dawson and I set to work and measured foot by foot many hundred yards of the cliffs, where forests of erect trees and calarites most

abound. It was hard work, as the wind one day was stormy, and we had to look sharp lest the rocking of living trees just ready to fall from the top of the undermined cliff should cause some of the old fossil ones to come down upon us by the run. But I never enjoyed the reading of a marvellous chapter of the big volume more. We missed a botanical aide-de-camp much when we came to the top and bottoms of calamites and all sorts of strange pranks which some of the compressed trees played."

In 1853 he was invited by Sir Edmund Head, then Governor-General of Canada, to be a member of a commission to report upon the reorganization of the University of New Brunswick.

In 1854 Forbes, who was professor of geology and zoology in the University of Edinburgh, died, and Lyell wrote to Sir William, advising him to apply for the chair, promising him his support and that of a number of his influential friends, while Sir William's "Acadian Geology," which had just been published in Edinburgh, testified to his abundant fitness for the position. He was about to set sail for Scotland to prosecute his candidature for the chair, when he received word that the place had been filled sooner than had been anticipated, by the appointment of a zoologist who had been strongly supported by the medical school of the university, but, by a strange coincidence, he received, almost on the very day that he was to sail for Scotland, a letter offering him the principalship of McGill University.

This institution, founded by royal charter in 1821, had made but slow progress in its earlier years, and was at this time, through litigation and other causes, almost in a state of collapse. Sir William, then Mr. Dawson, was pointed out to the governors of the college by Sir Edmund Head, who had formed a high opinion of his ability, as a man who if his services could be secured, was eminently fitted to undertake the task of reconstructing it. The services of Mr. Dawson were accordingly enlisted, and in 1855 he assumed the principalship of McGill University, stipulating at the same time that the chair of natural history should be assigned to him. In his Inaugural Discourse, delivered in November of this year, he said:—"Believing that in connection with this Institution and in this the chief city of British North America, I should have the best opportunities of promoting the study of the subjects to which I have devoted myself and at the same time of advancing the cause of education, I determined without hesitation to cast in my lot with yours; and I humbly trust that with the blessing of God on diligent effort I may be able to carry out the objects of my appointment. At a time when literary and scientific pursuits are so widely ramified, everyone who aims to do anything well must

have his special sphere of activity. Mine has been the study of nature, more especially in those by-gone aspects which it is the province of geology to investigate. My only other special qualification for my present position depends on the circumstance that the wants of my native province have induced me to devote much time to inquiries and pursuits relating to popular education. I come to you, therefore, as a naturalist and an educationalist, trusting that I may be enabled in these capacities to render myself useful, and asking for my youth and present inexperience in the affairs of this Institution your kind indulgence, and for the work in which I shall be engaged your zealous co-operation."

The University as he found it had three faculties and but sixteen professors, a number of whom gave only a portion of their time to university work, while the buildings and equipment were wretched. When it is stated that the University has now one hundred and thirty professors and instructors of various grades, and an equipment which is in all departments fairly good and in some of them unsurpassed, some idea may be gained of the progress which the institution made under Sir William Dawson's care and guidance. The Peter Redpath Museum is in itself a monument to his untiring energy, for its collections were brought together almost entirely by his unaided effort.

As Professor of Natural Science, Sir William at this time delivered courses in Chemistry, Botany, Zoology and Geology. Natural Science became a very favourite study among the students, for he was an excellent lecturer, and his enthusiasm for these studies was communicated to all who heard him. As years went on the instruction in the first three of these subjects was undertaken by others, and a special Chair of Geology and Palaeontology was endowed by his life-long friend and co-worker, Sir William Logan; a chair which he held until his final retirement. His teaching work, however, onerous as it might seem to a man of ordinary strength, represented but a small part of his daily labours. In addition to administering the affairs of the University he was first and foremost in every movement to further education in the province of Quebec and no educational board was complete without him. He was the Honorary President of the Natural History Society, and never missed a meeting or a field day, and also identified himself closely with many other societies in Montreal, sparing neither time nor labour on their behalf.

Over and above all this he found time to carry out original work along several lines, achieving most valuable results—as well as to write many popular works on science, more especially in its relation to religion. Original investigation he always considered to be one of the

chief duties and pleasures of a man of science. Most of his work along these lines was done during the summer vacations; in fact, he was led to accept the position of Principal of McGill University chiefly by the fact that the vacations gave him leisure and opportunity for work of this kind. He was always very progressive in his ideas relative to the scope and development of educational work, urging those in charge of such work to "survey and mark out on the ground wide fields of operation which they might hope in future to cultivate, and to occupy such portions here and there as seemed likely to yield an adequate return." In his own University he was continually urging the endowment of new chairs and the broadening of the University's work, so that all young men wishing to train themselves for any of the higher walks of life might in the University find their needs supplied. While always upholding the high value of a strictly academic education, he felt that in a young and rapidly growing country like Canada, whose development depended so largely upon the skill and knowledge which its people could bring to bear upon the problems confronting them, the study of science and its application to the needs of life were of especial importance, and strongly advocated the addition of teaching in Applied Science to the usual academic studies. He actually succeeded in establishing, as far back as 1858, a School of Civil Engineering, which attracted a considerable number of pupils, but which after a severe struggle for five years in the face of professional and official opposition, was at length suspended owing to the temporary financial embarrassments of the University. In the summer of 1870, however, he went abroad, and visited the chief science schools in Great Britain and the Continent, as well as in the United States, for the purpose of collecting information concerning the best methods and equipment for the teaching of science, and in the Annual University Lecture, delivered upon his return in the fall of that year, spoke as follows:—

"Everywhere, as a means to this end, it is felt to be necessary to provide the widest extent of science education for the mass of the people, and the highest perfection of such education for those who are to take leading places as original investigators or as directors of business undertakings.

"From the time when I first had the honour of addressing a Canadian audience, until this day, I have not ceased, in season and out of season, to urge this subject on the attention of the friends of education here, as one of the pressing wants of this country; and within the past few years, feeling that we were falling farther and farther behind other countries, I have made some special efforts to collect

additional information as to the state of science education abroad, and to bring this to bear on the public mind here, as opportunity offered.

"When I look back on the hopes and struggles of those earlier years, though I entertain a feeling of profound thankfulness to God for the measure of success and prosperity which has attended this University, and though I am most grateful to its many benefactors, I cannot forget the disappointment of my own hopes. Much has been done for general education, and McGill College has grown to be a comparatively great and prosperous institution. But all that I have done towards this any one could have done. The one thing that I could have done, for which I was willing to sacrifice all that I would have gained as an original worker in Geology, and which would have been of more real importance not only to Montreal, but to all this great country from Red River to Newfoundland, than all the rest, has not been done. I confess I often almost sink under the despairing feeling that it will not be done while I live; and that I may never have the opportunity of doing for this community the only great service that I believe myself competent to confer upon it.

"Yet I know that much good preliminary work has been done, that material has been accumulated and tastes for science created; and I am reluctant to abandon the hope that I may yet see in Montreal a thoroughly equipped institution, in which any young man, with the requisite ability and preliminary education, may learn the scientific facts and principles and receive the training in scientific methods necessary to qualify him for mining, metallurgy, assaying and engineering, agriculture, chemical manufactures, or other applications of science to art. Until this can be realized, I shall feel that the work of my life has been only very partially and imperfectly successful; and I shall know that this city has not taken the means to prepare itself fully for that greatness which its position and advantages mark out for it, but which it cannot attain except as the educated metropolis of an educated country—educated not merely in general learning and literature, but in that science which is power because it wields the might of those forces which are the material expressions of the power of the Almighty Worker."

It was one of the chief joys of Sir William's declining years that the "Canadian Lawrence or Sheffield" on whom he waited for the consummation of these his long cherished wishes was found in Sir William Macdonald, so that the present Faculty of Applied Science of McGill University with its numerous departments, its full staff of instructors and excellent equipment was fully organized before his death.

The higher education of women was also a subject to which he devoted much thought and attention, his efforts finally culminating in the establishment of the Royal Victoria College of McGill University, through the generosity of Lord Strathcona and Mount Royal.

Sir William, on many occasions when funds were not forthcoming in sufficient amount to carry out the plans which he advocated, subscribed large sums out of his own limited private means, and he was also the continual helper of needy students desiring to avail themselves of the University's teaching.

Sir William received the degree of M.A. from the University of Edinburgh in 1856, and the degree of LL.D. from the same university in 1884. His attainments and the value of his contributions to science were widely recognized, and he was elected an honorary or corresponding member of many learned societies on both sides of the Atlantic. He was made a Fellow of the Geological Society of London in 1854, and of the Royal Society in 1862. He was the first president of the Royal Society of Canada, and occupied the same position in the Geological Society of America, and in both the American and British Associations for the Advancement of Science. In 1881 he was made a Companion of the Order of St. Michael and St. George, and the same year received the Lyell medal from the Geological Society of London. In 1882 he was selected by the Marquess of Lorne to be the first president of the Royal Society of Canada, and devoted much time and labour, under the Marquess of Lorne, to its organization and the framing of its constitution.

In 1883 he attended the meeting of the British Association for the Advancement of Science, at Southport, in the interest of the meeting in Montreal in the following year, and spent the ensuing winter in Egypt and Syria studying the geology of those countries, more especially in its relation to sacred history, and accumulated much information on this subject, which appeared later in his book entitled "Modern Science in Bible Lands," as well as in other books and papers which he published subsequently.

He took an active part in the organization and proceedings of the meeting of the British Association for the Advancement of Science in Montreal in 1884, on the occasion of which he received the honour of knighthood.

From the time of its institution he took the deepest interest in the Royal Society of Canada, and was unceasing in his labours on its behalf. In his inaugural address, as President of the Society, at its opening meeting, he pointed out the important services which the newly established society might render to Canadian men of science and

literature as well as to the community at large, and the results which he confidently hoped that it might achieve.

"We are sometimes told," he said, "that the enterprise in which we are engaged is premature, that like some tender plant too early exposed to the frosts of our Canadian spring, it will be nipped and perish. But we must remember that in a country situated as this is, nearly everything is in some sense premature. It is with us a time of breaking up ground and sowing and planting, not a time of reaping or gathering fruit, and unless this generation of Canadians is content, like those that have preceded it, to sow what others must reap in its full maturity, there will be little hope for our country. In Canada at present, whether in science, in literature, in art or in education, we look around in vain for anything that is fully ripe. We see only the rudiments and beginnings of things, but if these are healthy and growing, we should regard them with hope, should cherish and nurture them as the germs of greater things in the future. Yet there is a charm in this very immaturity, and it brings with it great opportunities. We have the freedom and freshness of a youthful nationality. We can trace out new paths which must be followed by our successors, we have the right to plant wherever we please the trees under whose shade they will sit. The independence which we thus enjoy, and the originality which we can claim are in themselves privileges, but privileges that carry with them great responsibilities. * * * * *

"We aspire to a great name. The title of 'Royal Society,' which, with the consent of Her Gracious Majesty the Queen, we hope to assume, is one dignified in the mother country by a long line of distinguished men who have been Fellows of its Royal Society. The name may provoke comparisons not favourable to us; and though we may hope to shelter ourselves from criticism by pleading the relatively new and crude condition of science and literature in this country, we must endeavour, with God's blessing on earnest and united effort, to produce by our cultivation of the almost boundless resources of the territory which has fallen to us as our inheritance, works which shall entitle us, without fear of criticism, to take to ourselves the proud name of the Royal Society of Canada."

In 1893, Sir William was seized with a very severe attack of pneumonia, and his health became so seriously impaired that he was obliged to give up his work for a time and spend the winter in the southern United States. His strength, however, was not restored, and he resigned his position as Principal of McGill University in June, 1893, and retired from active work. During the latter years of his life his strength gradually ebbed away, and what little work he could

undertake consisted in arranging his collections and working on some unfinished papers. Several of these were published in 1894 and 1895; but the years of quiet labour in his favourite pursuits to which he looked forward at this time were cut short by a series of sharp attacks, culminating in partial paralysis, which forbade further effort. But even the week before his death, he essayed to put pen to paper in a last contribution to his beloved science, on the subject of the "Gold of Ophir." He passed away on the 19th of November, peacefully and without pain.

Lady Dawson, with three sons and two daughters, survive him. His eldest son, Doctor George M. Dawson, the present director of the Geological Survey of Canada, has inherited his father's taste for geological studies, and has achieved wide distinction in the world of science.

Sir William's first original contribution to science was a paper read before the Wernerian Society of Edinburgh in 1841 on a species of field mouse found in Nova Scotia. From that time onward he was a continuous contributor to scientific journals and to the publications of various learned societies. His papers were very numerous and covered a wide range of subjects in the domain of natural history. The most important work of his earlier years was an extended study of the geology of the eastern maritime provinces of the Dominion of Canada. His results are embodied in his "Acadian Geology," already mentioned. It is a volume of nearly 1,000 pages, is accompanied by a colored geological map of Nova Scotia, and has passed through four editions. In writing to Sir William in 1868 Sir Charles Lyell says of this work:

"I have been reading it steadily and with increased pleasure and profit. It is so full of original observations and sound theoretical views that it must, I think, make its way, and will certainly be highly prized by the more advanced scientific readers."

It is the most complete account which we have of the geology of Nova Scotia, New Brunswick, and Prince Edward Island, although since it appeared large portions of these provinces have been mapped in detail by the Geological Survey of Canada, and Sir William's conclusions modified in some particulars. In carrying out this work Sir William paid especial attention to the palæontology of the Carboniferous System and to the whole question of the nature and mode of accumulation of coal. He subsequently studied the palæontology of the Devonian and Upper Silurian Systems of Canada, discovering many new and important forms of plant life.

In 1884 he began the study of the Cretaceous and Tertiary fossil plants of Western Canada, and published the first of a series of papers

on the successive floras from the Lower Cretaceous onward, which appeared in the Transactions of the Royal Society of Canada. He also contributed a volume, entitled "The Geological History of Plants," to Appleton's International Scientific Series. In 1863 he published his "Air Breathers of the Coal Period," in which were collected the results of many years' study of the fossil batrachians and the land animals of the Coal Measures of Nova Scotia. The earliest known remains of *Microsauria* were then discovered by him in the interior of decayed tree stumps in the Coal Measures of South Joggins. The results of his later studies on these creatures were embodied in a series of subsequent papers which appeared from time to time.

On taking up his residence in Montreal his attention was attracted to the remarkable development of the Pleistocene deposits exposed in the vicinity of the city, and he undertook, on the advice of Sir William Logan, to make a detailed study of them, and especially of the remarkably rich fossil fauna which they contain. He also studied subsequently the Pleistocene deposits of the Lower St. Lawrence, and instituted comparisons between them and the present fauna of the Gulf of St. Lawrence and of the Labrador Coast. The results of these studies appeared in a series of papers as the work progressed, and were finally embodied in a volume entitled, "The Canadian Ice Age," which was issued in 1893, as one of the publications of the Peter Redpath Museum of McGill University. This is one of the most important contributions to the paleontology of the Pleistocene which has hitherto appeared.

Sir William's name is also associated with the renowned Eozoon Canadense, discovered by the Geological Survey of Canada in the Grenville limestones of the Canadian Laurentian, and described by him in 1864 as a gigantic foraminifer. Concerning this remarkable object there has been a widespread controversy and a great divergence of opinion. The literature on the subject, which includes many papers by Sir William, is quite voluminous, but the chief facts are summed up in his book entitled "The Dawn of Life," which appeared in 1875.

Sir William was also a prolific writer of popular works on various geological topics. Among these may be mentioned his "Story of the Earth and Man," his "Fossil Men and their Modern Representatives," his "Meeting Place of Geology and History," and his "Modern Science in Bible Lands." These books, all written in a very entertaining style, had a wide circle of readers and many of them passed through several editions.

Other volumes from his pen, as well as many papers contributed to various religious publications, treated of the relations of science and religion. One of the earliest of these was entitled "Archaia," and

dealt with the relations of historical geology to the Mosaic account of the Creation. In others he considered the relation of the evolutionary hypothesis to religious thought.

Sir William was a Presbyterian of the old school and strongly opposed to all theories of the evolution of man from brute ancestors, nor would he allow anything more than a very moderate antiquity for the species.

The study of geology, too, he would have emancipated from "that materialistic infidelity which, by robbing nature of the spiritual element and of its presiding divinity makes science dry, barren, and repulsive, and diminishes its educational value."

These works on the relations of science and religion, while they undoubtedly met a popular need, have but a transitory value, and they are not the works by which Sir William Dawson will be remembered. His reputation is founded on the great contributions to our permanent stock of knowledge which he has made, and which are embodied in his works on pure science, representing achievements of which any man might well be proud.

The proper continuance at McGill University of work in the science to which he devoted his life has been ensured by the establishment of a second chair in geology, to be known as the Dawson Chair, which shortly after his death was endowed in his memory by Sir William Macdonald.

He always valued most highly our connection with the mother country, and often insisted upon its importance in his addresses. "We should keep constantly in view," he said in a lecture on the *Duties of Educated Young Men in British America*, delivered as far back as 1863, "the links of connection which bind us to the great British Empire, and strengthen them as far as may be in our power. It is no small thing to be members of an organization the most stable and powerful in the world, and, at the same time, that which allows the greatest amount of liberty. Independently of all national prejudices, or patriotic feelings, or difference of origin, we cannot be too thankful for the privileges we thus enjoy; and if we can desire anything further in this respect, it seems to me that it should be sought, in endeavouring more completely and closely to unite all the members of the Empire in one great colonial and imperial council, having its seat in the metropolis of the Empire, and binding together all its scattered parts in closer union with one another, and with our common head."

Sir William was a man of quiet geniality, gentle and courtly in manner, but decided in opinion and firm in action. The pre-eminent

note of his character was sincerity and singleness of purpose. His work was done, to quote the Puritan poet's noble line, "as ever in his great Taskmaster's eye." His loss will be deeply felt by all who knew him, but especially by the Fellows of this Society and by the members of the University with which he was so long connected.

II.—*Bibliography of Sir John William Dawson,*

By H. M. AMI, M.A., D.Sc., F.G.S.

(Read May 21st, 1901.)

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